DOCUMENT RESUME

ED 393 007 CE 071 236

AUTHOR Hopey, Christopher E.; Harvey-Morgan, Joyce
TITLE Technology Planning for Adult Literacy. Practice Guide.
INSTITUTION National Center on Adult Literacy, Philadelphia, PA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
REPORT NO NCAL-PG-95-02
PUB DATE Nov 95
CONTRACT R117Q00003
NOTE 42p.
AVAILABLE FROM National Center on Adult Literacy, University of Pennsylvania, Publications, 3910 Chestnut Street, Philadelphia, PA 19104-3111 (order no. PG95-02).
PUB TYPE Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adult Basic Education; *Adult Literacy; Citations (References); *Computer Software; Computer Uses in Education; *Educational Planning; *Educational Technology; *Literacy Education; *Media Selection; Microcomputers

ABSTRACT

Although recent technological developments in both computing hardware and software present dramatic opportunities for adult literacy organizations, planning and preparation are required to capitalize on those opportunities. The process of technology planning described in this guide can focus organizational attention on the appropriate priorities and issues, and together with staff involvement, help to formulate a vision for technology use in adult literacy programming and a detailed road map for how to reach that vision. The guide begins with a brief overview of the technology planning process that includes information on what technology planning is, the basic principles of technology planning, and the need for a plan for doing technology planning. The second section outlines 11 steps of the technology planning process: (1) determine programmatic issues and goals; (2) develop a preliminary vision for technology use; (3) conduct an inventory of current technology and available resources; (4) explore the possibilities of using technology in adult literacy; (5) identify technology solutions; (6) reexamine the preliminary vision and set priorities; (7) evaluate specific technologies; (8) develop a technology budget; (9) determine staff development needs; (10) develop a technology implementation timeline; and (11) conduct an ongoing evaluation of the technology plan. Three appendixes include a stakeholder analysis chart for technology planning, a technology resource inventory chart, and a sample of a technology plan. The guide contains 18 references. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 393 007

TECHNOLOGY PLANNING FOR ADULT LITERACY

Christopher E. Hopey
Joyce Harvey-Morgan
National Center on Adult Literacy
University of Pennsylvania

NCAL PRACTICE GUIDE PG95-02
NOVEMBER 1995

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

NATIONAL CENTER ON ADULT LITERACY, UNIVERSITY OF PENNSYLVANIA, 3910 CHESTNUT STREET, PHILADELPHIA, PA 19104-3111

CE071 236

BEST COPY AVAILABLE

NCAL

Practice Guide

TECHNOLOGY PLANNING FOR ADULT LITERACY

Christopher E. Hopey
Joyce Harvey-Morgan
National Center on Adult Literacy
University of Pennsylvania

NCAL PRACTICE GUIDE PG95-02
NOVEMBER 1995

This work was supported by funding from the National Center on Adult Literacy at the University of Pennsylvania, which is part of the Educational Research and Development Center Program (Grant No. R117Q00003) as administered by the Office of Educational Research and Improvement, U.S. Department of Education, in cooperation with the Departments of Labor and Health and Human Services. The findings and opinions expressed here do not necessarily reflect the position or policies of the National Center on Adult Literacy, the Office of Educational Research and Improvement, or any other agency.

NATIONAL CENTER ON ADULT LITERACY
UNIVERSITY OF PENNSYLVANIA
3910 CHESTNUT STREET
PHILADELPHIA, PA 19104-3111
PHONE (215) 898-2100 FAX (215) 898-9804

The National Center on Adult Literacy (NCAL) was established in 1990 by the U.S. Department of Education, with co-funding from the Departments of Labor and Health and Human Services. The mission of NCAL addresses three primary challenges: (a) to enhance the knowledge base about adult literacy; (b) to improve the quality of research and development in the field; and (c) to ensure a strong, two-way relationship between research and practice. Through applied research and development and dissemination of the results to researchers, policymakers, and practitioners, NCAL seeks to improve the quality of adult literacy programs and services on a nationwide basis. NCAL serves as a major operating unit of the Literacy Research Center at the University of Pennsylvania.

NCAL publications to date include:

May 1992 *Matching Literacy Testing With Social Policy: What Are the Alternatives?*
Richard L. Venezky *(PB92-01, 7 pages)*

Oct 1992 *Life-Span and Life-Space Literacy: Research and Policy in National and International Perspectives*
Daniel A. Wagner *(OP92-01, 15 pages)*

Oct 1992 *Expanding Theories of Adult Literacy Participation*
Karen Reed Wikelund, Stephen Reder, & Sylvia Hart-Landsberg *(TR92-01, 30 pages)*

Oct 1992 *Invitations to Inquiry: Rethinking Staff Development in Adult Literacy Education*
Susan L. Lytle, Alisa Belzer, & Rebecca Reumann *(TR92-02, 44 pages)*

Dec 1992 *Developing the Professional Workforce for Adult Literacy Education*
Susan L. Lytle, Alisa Belzer, & Rebecca Reumann *(PB92-02, 11 pages)*

Jan 1993 *The Analysis of Adult Literacy: Problems in Factor Analysis Bib-Spiralled Item Administration*
David Kaplan *(OP93-01, 18 pages)*

Mar 1993 *The Impact of Workplace Literacy Programs: A New Model for Evaluation of Workplace Literacy Programs*
Larry Mikulecky & Paul Lloyd *(TR93-02, 180 pages)*

Mar 1993 *Literacy and Machines: An Overview of the Use of Technology in Adult Literacy Programs*
Terilyn C. Turner *(TR93-03, 86 pages)*

Jun 1993 *Myths and Misconceptions in Adult Literacy: A Research and Development Perspective*
Daniel A. Wagner *(PB93-01, 10 pages)*

Jun 1993 *Literacy and Development: Rationales, Assessment, and Innovation*
Daniel A. Wagner *(IP93-01, 50 pages)*

Jun 1993 *Early Childhood, Family, and Health Issues in Literacy: International Perspectives*
Laurel D. Puchner *(IP93-02, 45 pages)*

Sep 1993 *What Makes Workers Learn? The Role of Incentives in Workplace Education and Training*
Donald Hirsch & Daniel A. Wagner (Eds.) *(IP93-03, 243 pages)*

Sep 1993 *Prison Literacy: Implications for Program and Assessment Policy*
Anabel Newman, Warren Lewis, & Carolyn Beverstock *(TR93-01, 219 pages)*

Sep 1993 *Management Information Systems in Adult Education: Perspectives From the States and From Local Programs*
Mark A. Kutner, Lenore Webb, Rebecca Herman, & Pelavin Associates, Inc. *(TR93-04, 150 pages)*

Sep 1993 *What Can Employers Assume About the Literacy Skills of GED Graduates?*
David Kaplan & Richard L. Venezky *(TR93-05, 45 pages)*

NCAL publications to date (continued)

Sep 1993 *Should Reading-Disabled Adults Be Distinguished From Other Adults Seeking Literacy Instruction? A Review of Theory and Research*
Anne E. Fowler & Hollis S. Scarborough *(TR93-07, 101 pages)*

Sep 1993 *When Less Is More: A Comparative Analysis for Placing Students in Adult Literacy Classes*
Richard L. Venezky, Page S. Bristow, & John P. Sabatini *(TR93-08, 46 pages)*

Sep 1993 *Metacognitive Aspects of Adult Literacy*
Scott G. Paris & Andrea Parecki *(TR93-09, 44 pages)*

Nov 1993 *Teamwork and Literacy: Learning From a Skills-Poor Position*
Sylvia Hart-Landsberg & Steve Reder *(TR93-06, 63 pages)*

Nov 1993 *Motivations for Learning: Voices of Women Welfare Reform Participants*
Karen Wikelund *(TR93-10, 54 pages)*

Nov 1993 *Initiating Practitioner Inquiry: Adult Literacy Teachers, Tutors, and Administrators Research Their Practice*
Susan L. Lytle, Alisa Belzer, & Rebecca Reumann *(TR93-11, 69 pages)*

Nov 1993 *Coalition Building for Adult Literacy: Historical and Organizational Perspectives*
Anabel P. Newman & Bernadette Lehman *(TR93-13, 68 pages)*

Nov 1993 *Effective Service Delivery in Adult Literacy Programs: A Policy Review and Recommendations*
Judith Ann Koloski *(TR93-14, 46 pages)*

Dec 1993 *Issues and Challenges in Adult Numeracy*
Iddo Gal *(TR93-15, 62 pages)*

Dec 1993 *Adult Literacy Training and the Integration of Human Services*
Elizabeth R. Reisner *(TR93-16, 30 pages)*

Apr 1994 *Measuring Gain in Adult Literacy Programs*
Richard L. Venezky, Page S. Bristow, & John P. Sabatini *(TR93-12, 24 pages)*

Apr 1994 *Understanding Family Literacy: Conceptual Issues Facing the Field*
Vivian L. Gadsden *(TR94-02, 32 pages)*

Apr 1994 *Children, Parents, and Families: An Annotated Bibliography on Literacy Development In and Out of Program Settings*
Vivian L. Gadsden, Ludo C. P. Scheffer, & Joel Hardman *(TR94-04, 84 pages)*

Jun 1994 *Literacy Transfer: A Review of the Literature*
Larry Mikulecky, Peggy Albers, & Michele Peers *(TR94-05, 21 pages)*

Jun 1994 *Instruction and Assessment for Limited-English-Proficient Adult Learners*
Ronald W. Solórzano *(TR94-06, 33 pages)*

Jun 1994 *Early Warning Signs of Functional Illiteracy: Predictors in Childhood and Adolescence*
Nazli Baydar, Jeanne Brooks-Gunn, & Frank F. Furstenberg *(OP94-01, 13 pages)*

Jul 1994 *Use It or Lose It? The Problem of Adult Literacy Skill Retention*
Daniel A. Wagner *(TR94-07, 27 pages)*

Jul 1994 *Technology: New Tools for Adult Literacy,* Videoconference Participant Materials
Joyce Harvey-Morgan, Christopher Hopey, & R. Karl Rethemeyer (Eds.)
(PR94-01, 58 pages)

Sep 1994 *Supply and Demand for Literacy Instruction in the United States*
Richard L. Venezky & Daniel A. Wagner *(TR94-10, 13 pages)*

Sep 1994 *The Professionalization of the Teacher in Adult Literacy Education*
Timothy Shanahan, Maureen Meehan, & Stephen Mogge *(TR94-11, 20 pages)*

NCAL publications to date (continued)

Sep 1994 *The Role of Literacy in the Wealth of Individuals and Nations*
Sue E. Berryman *(TR94-13, 15 pages)*

Oct 1994 *Abilities and Competencies in Adulthood: Life-Span Perspectives on Workplace Skills*
Jacqui Smith & Michael Marsiske *(TR94-12, 36 pages)*

Oct 1994 *Proceedings. Conference on Adult Mathematical Literacy*
Iddo Gal & Mary Jane Schmitt (Eds.) *(PR94-02, 130 pages)*

Nov 1994 *Literacy and Adults With Developmental Disabilities*
Karen A. Erickson, David A. Koppenhaver, & David E. Yoder *(TR94-15, 31 pages)*

Nov 1994 *Adult Basic Skills in OECD Countries: Policy Issues and a Research Agenda*
David Stern & Albert Tuijnman *(IP94-01, 12 pages)*

Dec 1994 *Who Counts in Adult Literacy Programs? A National Survey of Numeracy Education*
Iddo Gal & Alex Schuh *(TR94-09, 20 pages)*

Dec 1994 *Adult Numeracy Instruction: A New Approach*, Videoconference Participant Packet
Iddo Gal, Lynda Ginsburg, Ashley Stoudt, R. Karl Rethemeyer, & Caroline Brayer Ebby
(PR94-04, 58 pages)

Dec 1994 *Literacy and Welfare Reform: Are We Making the Connection?*
Elena Cohen, Susan Golonka, Rebecca Maynard, Theodora Ooms, & Todd Owen *(TR94-16, 47 pages)*

Jan 1995 *Self-Assessed Skill Needs and Job Performance*
Peter Cappelli & Nikolai Rogovsky *(TR94-08, 12 pages)*

Jan 1995 *Literacy and Voting Behavior: A Statistical Analysis Based on the 1985 Young Adult Literacy Survey*
David Kaplan & Richard L. Venezky *(TR94-14, 13 pages)*

Jan 1995 *Literacy and Older Adults in the United States*
Gail Weinstein-Shr *(TR94-17, 25 pages)*

Jan 1995 *Proxy Measurement of Adult Basic Skills: Lessons From Canada*
T. Scott Murray *(TR94-18, 18 pages)*

Jan 1995 *Using Large-Scale Assessment Results to Identify and Evaluate Generalizable Indicators of Literacy*
Irwin S. Kirsch & Ann Jungeblut *(TR94-19, 14 pages)*

Jan 1995 *Native Literacy and Language Roundtable Proceedings*
Joyce Harvey-Morgan (Ed.) *(PR94-03, 26 pages)*

Mar 1995 *The Military Experience and Workplace Literacy: A Review and Synthesis for Policy and Practice*
Thomas Sticht *(TR94-01, 78 pages)*

Apr 1995 *What Works? Literacy Training in the Workplace*, Videoconference Participant Materials
Joyce Harvey-Morgan (Ed.) *(PR95-01, 38 pages)*

May 1995 *Adult Literacy: The Next Generation*
An NCAL White Paper *(TR95-01, 29 pages)*

Nov 1995 *Making Sense of Technology Terminology for Adult Literacy: A Glossary and Annotated Bibliography*
Alycia Donohoe, Joseph Campbell, Camille Ciggs, R. Karl Rethemeyer, & Christopher Hopey *(PG95-01, 47 pages)*

Nov 1995 *Technology Planning for Adult Literacy*
Christopher E. Hopey & Joyce Harvey-Morgan *(PG95-02, 45 pages)*

Nov 1995 *Funding Technology in Adult Literacy*
Christopher E. Hopey & Joyce Harvey-Morgan *(PG95-03, 64 pages)*

Nov 1995 *Making the Right Choice: Evaluating Computer Software and Hardware for Adult Literacy Instruction*
Christopher E. Hopey, R. Karl Rethemeyer, & Jennifer A. Elmore *(PG95-04, 54 pages)*

Nov 1995 *Joining the On-Line Community: An Introduction for Adult Literacy*
R. Karl Rethemeyer *(PG95-05, 146 pages)*

NCAL publications to date (continued)

Nov 1995 *Comparing Applied Literacy and Basic Skills Tests as Measures of Adult Literacy Performance*
Richard L. Venezky, John P. Sabatini, & Page S. Bristow *(TR95-03, 48 pages)*

Nov 1995 *Standards for Adult Literacy: Focal Points for Debate*
Regie Stites, Ellen Foley, & Daniel A. Wagner *(TR95-04, 34 pages)*

Nov 1995 *Adult Literacy in the United Kingdom: A History of Research and Practice*
Brian V. Street *(TR95-05, 54 pages)*

Nov 1995 *What Does "100% Juice" Mean? Exploring Adult Learners' Informal Knowledge of Percent*
Lynda Ginsburg, Iddo Gal, & Alex Schuh *(TR95-06, 44 pages)*

Nov 1995 *Learning to Read: Literacy Acquisition by Children and Adults*
Charles A. Perfetti & Maureen A. Marron *(TR95-07, 56 pages)*

Information on ordering of NCAL publications may be addressed to Dissemination at NCAL.
Revised February 19, 1996

NCAL MANAGEMENT

Daniel A. Wagner, *Director*
Richard L. Venezky, *Co-Director for Research and Development*
Joyce Harvey-Morgan, *Associate Director*
Vivian L. Gadsden, *Associate Director*
Sandra K. Stewart, *Manager of Dissemination*
Mary O. Russell, *Administrative Coordinator*
Janet C. Smith, *Editor*
R. Karl Rethemeyer, *Manager, Literacy Technology Laboratory*

NCAL SENIOR PROJECT DIRECTORS

María Carlo, *University of Pennsylvania*
Vivian L. Gadsden, *University of Pennsylvania*
Iddo Gal, *University of Pennsylvania*
Joyce Harvey-Morgan, *University of Pennsylvania*
Susan L. Lytle, *University of Pennsylvania*
Larry Mikulecky, *Indiana University*
Scott G. Paris, *University of Michigan*
Laurel D. Puchner, *University of Pennsylvania*
Stephen Reder, *Northwest Regional Educational Laboratory*
R. Karl Rethemeyer, *University of Pennsylvania*
Regie Stites, *University of Pennsylvania*
Richard L. Venezky, *University of Delaware*
Daniel A. Wagner, *University of Pennsylvania*

NATIONAL ADVISORY PANEL

Chair: Gloria Twine Chisum, *Vice-Chair, University of Pennsylvania Board of Trustees*
Richard C. Anderson, *Director, Center for the Study of Reading, University of Illinois*
Joan D. Baraloto, *Director, Education and Family Initiatives, USA Today*
James Bowling, *Executive Director, Ohio Department of Education, Adult Basic and Literacy Education*
Jack Bowsher, *Director of Education (ret.), IBM, Inc.*
Jeanne Chall, *Professor, Graduate School of Education, Harvard University*
John Cole, *Director, The Center for the Book, Library of Congress*
The Honorable William F. Goodling, *U.S. Representative, Pennsylvania*
Barbara Kapinus, *Director, State Education Assessment Center, Council of Chief State School Ollicers*
Carl Kaysen, *David W. Skinner Chair of Political Economy, Massachusetts Institute of Technology*
Irwin Kirsch, *Executive Director, Language Learning and Assessment Group, Educational Testing Service*
Noreen Lopez, *Manager, Aduli Education Product Development, Contemporary Books, Inc.*
Marciene Mattleman, *Executive Director, Philadelphia Futures*
Geraldine Novelo, *Deputy Director (ret.), Instituto Nacional para la Educación de los Adultos, Mexico*
Van D. Ooms, *Senior Vice President and Director of Research, Committee for Economic Development*
Bernard P. Reca, *Vice President, Bell Atlantic Network Services, Inc.*
Anthony Sarmiento, *Assistant Director, Human Resources Development Institute, AFL-CIO*
Robert Schwartz, *Program Director, Education, Pew Charitable Trusts*
Senator Paul Simon, *U.S. Senator, Illinois*
Dorothy Strickland, *Professor, Graduate School of Education, Rutgers University*
Francis X. Sutton, *Vice President (ret.), Ford Foundation*
Peter Waite, *Executive Director, Laubach Literacy Action*

NCAL EDITORIAL REVIEW COMMITTEE

Eunice Askov, *Pennsylvania State University*
Hal Beder, *Rutgers University*
Marilyn Binkley, *National Center for Educational Statistics, U.S. Department of Education*
Ben Burenstein, *Drexel University*
Betty Conaway, *Baylor University*
Aydin Durgunoglu, *University of Illinois at Urbana*
Marcia Farr, *University of Illinois at Chicago*
John Fleischman, *Media Services and OTAN, Sacramento County Office of Education*

NCAL EDITORIAL REVIEW COMMITTEE (CONTINUED)

Beth Foley, *Utah State University*
Maggie Gaines, *Baltimore City Literacy Corp.*
Sheryl Gowen, *Georgia State University*
Karl Haigler, *Salem Company*
Keiko Koda, *Ohio University*
Kenneth Levine, *University of Nottingham, UK*
Noreen Lopez, *Adult Education Product Development, Contemporary Books, Inc.*
Mary Massie, *Helene Curtis Industries*
Peter B. Mosenthal, *Syracuse University*
Judith Norback, *Center for Skills Enhancement, Inc.*
Richard K. Olson, *University of Colorado*
Janice Phillips, *Assistant Professor, AED Department, William Rainey Harper College*
Jorie Philippi, *Principal, Performance Plus Learning Consultants, Inc., Charleston, West Virginia*
Ronald Pugsley, *Office of Vocational & Adult Education, U.S. Department of Education*
Thomas Reeves, *University of Georgia*
Judith Sotir, *Manager, ITD Center for Excellence, Waunsobee Community College*
Timothy Shanahan, *University of Illinois at Chicago*
Wilma Sheffer, *Workforce Skills Enhancement, St. Louis Community College*
Ronald Solórzano, *Occidental College*
Keith Stanovich, *Department of Applied Psychology, Ontario Institute for Studies in Education*
Sondra Stein, *National Institute for Literacy*
Sally Waldron, *SABES World Education Inc.*
Terrence G. Wiley, *California State University Long Beach*

TABLE OF CONTENTS

Table of Contents *i*
Abstract *iii*

Introduction 1
An Overview of Technology Planning 2
What Is Technology Planning? 2
The Basic Principles of Technology Planning 2
Have a Plan to Do Technology Planning 3
Technology Planning: The Step-by-Step Process 4
Step 1: Determine Programmatic Issues and Goals 5
Step 2: Develop a Preliminary Vision for Technology Use 6
Step 3: Conduct an Inventory of Current Technology and Available Resources 7
Step 4: Explore the Possibilities of Using Technology in Adult Literacy 7
Step 5: Identify Technology Solutions 9
Step 6: Re-Examine the Preliminary Vision: Set Technology Vision and Priorities 11
Step 7: Evaluate Specific Technologies 11
Step 8: Develop a Technology Budget 12
Step 9: Determine Staff Development Needs 14
Step 10: Develop a Technology Implementation Timeline 16
Step 11: Conduct an Ongoing Evaluation of the Technology Plan 16
Conclusions 17

References *19*
Appendix A: Stakeholder Analysis Chart *A-i*
Appendix B: Technology Resource Inventory Chart *B-i*
Appendix C: Sample of a Technology Plan *C-i*

TECHNOLOGY PLANNING FOR ADULT LITERACY

Christopher E. Hopey
Joyce Harvey-Morgan
National Center on Adult Literacy
University of Pennsylvania

ABSTRACT

Recent technological developments in both computing hardware and software present dramatic opportunities for adult literacy organizations, but planning and preparation are required to capitalize on those opportunities. The current push to expand technology cannot be achieved without administrative involvement and leadership. The process of technology planning described in this guide can focus organizational attention on the appropriate priorities and issues, and together with staff involvement, formulate a vision for technology use in adult literacy programming and a detailed road map for how to reach that vision. This guide begins with a brief overview of the technology planning process and presents a step-by-step process for technology planning.

INTRODUCTION

Today's emerging technologies offer enormous potential for substantially changing the field of adult literacy and for improving the way adult educators practice (U.S. Congress, 1993). These new technologies are creating new opportunities to reach learners, improving the productivity of learners, and offering new ways for administrators and instructors to communicate (Lovell, 1993; U.S. Congress, 1993). Technology offers privacy, control, individualization, immediate feedback, and flexibility to the adult learner (Askov, 1991; Turner, 1993). It can be used to motivate and encourage adult learners to work in groups, which is an increasingly important skill to develop, since collaborative decision making is increasingly in demand in the workplace (Fine, 1991). New technologies in video, telecommunications, and consumer electronics have redefined the skills that people need in order to function successfully at home and at work. Advances in technology have created a challenge and have changed the equation for adult literacy organizations by offering innovative tools for improving instruction and administration.

Planning is increasingly becoming a priority among adult literacy programs. Although some adult literacy organizations engage in planning activities, few have extended those activities to technology. Technology planning is a process that can assist adult literacy educators in making more effective purchasing decisions, improving their use of technology, and utilizing resources more efficiently. Technology planning brings clarity and long-term direction for the use of technology in instructional and management practices. Regardless of an organization's size or experience, there are two essential ingredients necessary in order to make planning successful (Below, Morrisey, & Acomb, 1987). First, all administrators and instructors must understand their roles and tasks. Second, there must be an organizational commitment to both the technology plan and the technology planning process itself. One of the basic premises of this guide is that the process of technology planning is as important as the technology plan itself.

This guide has been written primarily for adult literacy administrators, but instructors and volunteers will also benefit from reading it. The guide is useful for a wide range of organizations including school districts, community colleges, and community-based literacy organizations.

The purpose of this guide is to present a detailed process for the planning and implementation of technology in adult literacy organizations. The technology planning process described in this paper is straightforward and will be easy for most adult literacy organizations to adopt. The guide is organized into two sections:

- An Overview of Technology Planning
- Technology Planning: The Step-by-Step Process

A series of guides and reports on adult literacy and technology has been produced by the National Center on Adult Literacy (NCAL) to help practitioners evaluate and use technology effectively. *Funding Technology in Adult Literacy,* written to complement *Technology Planning for Adult Literacy,* is designed to assist literacy educators in acquiring funding for educational technology. A third technology guide, *Joining the On-Line Community,* introduces the concepts, hardware, and procedure of on-line communication while providing numerous examples and appendices specific to adult literacy practitioners. *Making Sense of Technology Terminology for Adult Literacy: A Glossary and Annotated Bibliography* complements this volume by clearly defining many frequently used technology terms and helping to direct further reading. *Making the Right Choice: Evaluating Computer Software and Hardware for Adult Literacy* is designed to help educators select appropriate technology for their programs.

AN OVERVIEW OF TECHNOLOGY PLANNING

WHAT IS TECHNOLOGY PLANNING?

Technology planning can assist literacy organizations with the technology decision making process by establishing standards, norms, and methods for evaluating, purchasing, implementing, and using technology. Furthermore, technology planning can help adult literacy organizations identify program and technology priorities and match those priorities with organizational, human, and financial resources.

Planning is an ongoing process that translates program and technology needs into concrete actions. It allows adult literacy organizations to take advantage of technology innovations while minimizing the negative impact of unexpected challenges. Planning provides a road map for the implementation of technology and can result in more efficient expenditure of limited resources.

THE BASIC PRINCIPLES OF TECHNOLOGY PLANNING

There are a few basic principles that should drive the technology planning process. These principles are based in part on a model developed by Shirley (1988). Technology planning for adult literacy should

- be an organized and continuous process, use a simple straightforward planning model, and result in a document that improves how technology is used for instruction, management, assessment, and communications;

- take into account the mission and philosophy of the adult literacy organization and be "owned" by that organization, its administrators, and instructors (while outside assistance, such as that provided by a consultant, can bring a broad perspective and knowledgeable opinions to the technology planning process, the process must have the commitment of program staff);
- be broad but realistic in scope, with economical and technically feasible solutions;
- involve all the stakeholders, including administrators, instructors, staff members, students, and technology experts with experience in education;
- identify the strengths and weaknesses of the organization and how each will impact the implementation of technology;
- formalize the procedures and methods for making technology decisions, including the setting of priorities, purchase, evaluation, upgrading, and use of technology; and
- be driven by educational goals and objectives rather than by technological developments.

HAVE A PLAN TO DO TECHNOLOGY PLANNING

Before undertaking technology planning, it is important to have the commitment and support of the institutional leaders, staff, and instructors. The best way to achieve this is to do some simple preplanning to encourage participation in the process and to minimize later setbacks. An effective technology planning process should be consciously and formally organized, since preplanning involves the right people at the right time. The following set of suggested activities can help literacy organizations get started with technology planning:

- Decide who should be involved, what role each person will play in the planning and implementation of technology, and if a committee or advisory group should be assembled.
- Preview other planning processes that the organization has completed and identify any useful insights for improving this planning process.
- Review the planning processes of other literacy organizations to identify useful material that can serve as a paradigm.
- Identify a lead person or "change agent" who will organize the planning process and make sure everyone involved has adequate input.
- Determine who will be responsible for writing the plan.
- Determine a timeline for completing the plan.

TECHNOLOGY PLANNING: THE STEP-BY-STEP PROCESS

This section outlines a series of steps that are important for technology planning. It is recommended that literacy organizations follow these steps generally but alter them to meet their own particular needs and circumstances.

The Steps in Developing a Technology Plan in Adult Literacy

Step 1:	Determine Programmatic Issues and Goals
Step 2:	Develop a Preliminary Vision for Technology Use
Step 3:	Conduct an Inventory of Current Technology and Available Resources
Step 4:	Explore the Possibilities of Using Technology in Adult Literacy
Step 5:	Identify Technology Solutions
Step 6:	Re-Examine the Preliminary Vision: Set Technology Vision and Priorities
Step 7:	Evaluate Specific Technologies
Step 8:	Develop a Technology Budget
Step 9:	Determine Staff Development Needs
Step 10:	Develop a Technology Implementation Timeline
Step 11:	Conduct an Ongoing Evaluation of the Technology Plan

The technology planning process should include a written plan. Writing the plan will help to solidify the ideas and concepts that have been discussed and debated by the planners. It also provides a document to which others can react, and it can become the basis for effective technology fund-raising endeavors. Writing the plan should begin at the start of the planning process. The plan will gradually evolve into a formal written document as the process unfolds.

Step 1: Determine Programmatic Issues and Goals

Technology lends itself well to adult literacy instruction (Massachusetts Software Council, Inc., 1994) because it is a powerful tool that, when properly implemented, improves the delivery of services. However, instructors and staff have little incentive to tackle the technical and scheduling problems associated with technology unless they have a clear idea of how it can improve teaching and learning (Means et al., 1993). Exactly which educational goals a literacy organization should address and attempt to accomplish must be determined before the technology plan is implemented (Holmes & Rawitsch, 1993).

Technology should not drive decisions or educational goals. Rather, decision making should be based on the educational needs of the adult learner and the needs of staff members. Technology cannot prescribe for an instructor which students should use the technology, how often it should be used, or how to integrate technology into existing instructional practices. Unless staff start out with specific educational goals, technology will most likely be used to reinforce the status quo (Cohen, 1988; Cuban, 1986). Educational goals should be developed around student needs and administrative goals around staff needs and technology should be used to help achieve these goals. Such goals could include increased student achievement (i.e., improved reading and writing, greater employability, increased self-confidence, and empowerment), better communication among staff members, and more community involvement (i.e., volunteers, fund-raising, etc.).

The first consideration in developing goals is to determine who the stakeholders are in the literacy organization and what their interests and expected outcomes are for the use of technology (see Appendix A). Undoubtedly the most important stakeholder is the adult learner, but staff, the community, and funders should also be included. Each of these stakeholders has a set of educational or administrative issues and objectives that technology can address.

Before moving ahead with the planning process, it is important to pause and answer a few basic questions. The questions below should help literacy organizations develop useful goals.

- What are the literacy organization's present values and goals?
- What are adult learners expected to know and be able to do when they complete their instructional program?
- What are the educational needs of adult learners in the literacy organization? Are their needs changing? What are the future educational needs of these adult learners?
- How many adult learners are being served? Is the number of adult learners increasing or decreasing?
- What are the educational needs of the community? Are these needs changing? What are the future educational needs of the community?

- How is instruction generally delivered?
- What curriculum is being taught?
- Is there an established process for reviewing instruction and the curriculum? Have any new curricular areas been identified (i.e., adults with learning disabilities, family literacy, etc.)?
- How flexible is the organization's literacy instruction in terms of learner access and assessment?
- What are the administrative needs of the literacy organization? Are these needs changing? What are the future administrative needs of the literacy organization?

There is evidence that when educational goals are not decided upon before technology implementation, technology can become a drain on resources and add to the burdens of teachers who are already trying to do too much (Piele, 1989). This problem can be avoided by formulating a plan to connect educational goals, values, and objectives to technology use. Once the stakeholders involved understand the educational goals and see how technology will make their lives better, they are likely to become more open to technology planning and implementation.

Step 2: Develop a Preliminary Vision for Technology Use

A preliminary vision of how technology might be used should embody the individual program's educational goals and issues. It should reflect what an organization thinks the educational process could be with the broad adoption of technology (Massachusetts Software Council, Inc., 1994). The vision should be creative while at the same time realistic. The ultimate vision of how technology will be applied must reflect the clients served, the resources available, and the commitment and willingness of the staff and students to use technology. Establishing a vision is preliminary at this step; changes and adjustments will occur.

The following issues need to be addressed when developing a preliminary vision for technology use:

- Consider the roles technology could play in the areas of instruction, administration, assessment, and communication in your literacy program.
- Decide upon a set of goals and outcomes that staff and students would like to achieve from the use of technology (e.g., improved retention, increased achievement, enhanced communication among satellite sites, etc.).

Step 3: Conduct an Inventory of Current Technology and Available Resources

Before going headfirst into planning, adult literacy organizations need to review technology availability and use in their own organizations. It is necessary to identify the organization's strengths, weaknesses, and available resources. The energy put forth up front in researching and collecting this data makes the implementation much easier and more effective. The following tasks should be included in the inventory:

1. Identify the technology currently available within the organization and analyze how effectively it is being used. Include computers, printers, software, and low-level technologies such as VCRs, videotapes, audiotape recorders, and televisions.
2. Determine the organization's internal strengths and weaknesses in terms of using technology. Include an analysis of financial, human, and organizational resources. Pay close attention to the level of commitment of the organizational leaders, the level of interest among students and staff, and the capabilities of the organization's infrastructure (i.e., physical plant, location, etc.).
3. Interview staff, instructors, volunteers, and organizational leaders to determine who has expertise that can be utilized to assist in the technology planning and implementation process.
4. Determine who in the community, state, or region can assist in the implementation of technology by providing advice, technical support, documentation, software reviews, and/or training.
5. Determine which literacy groups such as LVA, Laubach, state literacy resource centers, school districts, colleges and universities, and national organizations, such as the National Center on Adult Literacy, have assistance available for the implementation and support of technology.

Step 4: Explore the Possibilities of Using Technology in Adult Literacy

With technological change occurring at a rapid pace, purchasers of new technology sometimes feel hard pressed to keep up (Fine, 1991). Literacy organizations, due to limited budgets and staff, have a difficult time choosing and buying technology. Often they lack adequate information about the newest technologies or how to use them (Askov, 1991). The key to technology planning is to make informed decisions. Without good information about the use of technology in adult literacy, planners are at a disadvantage. The best way to overcome this is to take a broad view of technology and educate planners and staff about current and emerging technologies and their benefits.

Technology's many advantages include increased learner privacy, increased individualization by allowing learners to work at their own pace, cost effectiveness, and flexibility of student access to instruction. It can have apparent drawbacks too, such as cost, need for staff training, lack of hardware and software compatibility, inappropriate software designs, and the use of poor pedagogical principles in software (Askov, 1991). In the long run, however, technology is invaluable to literacy organizations.

Not every type of technology is appropriate for every student or every adult literacy organization. Many technologies require personal and programmatic changes for implementation. Others are relatively easy to implement and use. Before making a technology decision, planners should explore the vast range of technologies available. These include the following:

- *Personal Digital Assistants (PDAs)/Handheld Devices*—inexpensive pocket-sized tools that accept handwritten input, useful because of their mobility and low cost.
- *Computers/Multimedia Systems*—interactive learning tools that incorporate the use of VCRs, CD-ROMs, laser discs, sound effects, music, and hypertext.
- *Integrated Learning Systems(ILS)*—computer-based comprehensive software packages that link a basic skills curriculum with a management system for student assessment.
- *Networks/Servers*—networking is the process of connecting computers to each other in order to share files, such as a database of students; to communicate (i.e., via electronic mail); and to hook up to printers and other peripheral devices.
- *On-Line Communications/Internet*—an easy and inexpensive way to communicate with others around the world. On-line communications and their interactivity are changing how adult learners and teachers access information and communicate with text, voice, and images.
- *Telecommunications/Distance Learning*—brings video-based instruction to the home and rural locations. Future telecommunications will provide interactive classrooms and multimedia learning experiences for adults at the touch of a button.
- *Authentic Learning Tools*—technologies being developed that provide adult learners with real-life problems and situations, as opposed to context-free drills. Such technologies will enable teachers to personalize instruction for specific individual needs.

All of these technologies have the potential to assist literacy organizations in the delivery of services. However, since the level of technology use in adult literacy organizations is partially determined by the integration of technology into regular practices and routines, technologies must be selected that users (students and staff) want to use and from which they will benefit. Some of the best ways to explore the possibilities of technology in adult literacy include the following:

- Visit other literacy organizations or other educational institutions to investigate the uses of technology; learn from their successes and try to avoid some of the most common mistakes they have made.

- Utilize the library and other educational organizations to collect publications on educational technology, including current research on and expertise in the use of computers in literacy organizations and the selection and evaluation of technology.
- Attend conferences or demonstrations about the new technologies available for purchase.
- Invite technology vendors to the organization for a private technology demonstration.
- Subscribe to a few current technology and educational publications to keep up to date with new and emerging technologies.
- Hire a consultant to provide some technology expertise and technology training to planners.
- Join professional organizations such as the International Society for Technology Educators (ISTE).

Step 5: Identify Technology Solutions

Identifying technology solutions is an extension of the previous step. Here, the emphasis is on examining the application of the specific technologies to the adult literacy programs (i.e., how can technologies help to address the organization's instructional, assessment, administration, and communication issues?).

One of the most helpful ways to identify which technology solutions are the most effective is to examine the relationship between technology and the user (Turner, 1993). Technology solutions are most effective when they are integrated with the regular activities of the users (students or staff). When technology is seen as an add-on, it can be resented or seen as burdensome (Cohen, 1988).

Many of the early technology supporters in adult literacy believed a computer system would engage the adult learner directly without teacher involvement. Studies have shown that this was not only unrealistic but also inappropriate (Means et al., 1989). We now know that the best technology solutions include a significant role for the teacher.

In the area of administration, many tasks can be facilitated or even eliminated with technology solutions. In general, technology can be easily adapted to write reports or maintain a database. A typical use is to improve the tracking of student progress with a computerized database. In the area of communications, one of the most common technology solutions is electronic mail (e-mail), which can improve and increase the sharing of information among literacy organizations (Turner, 1993). In addition, electronic bulletin boards and other network services provide forums for literacy providers to share concerns and solutions, as well as to access information. A few states (e.g., California and New York) have taken a leadership role in establishing on-line networks for electronic communications. As the cost of on-line communication decreases, more literacy organizations will have the resources to get involved.

Technology can also be used effectively as an instructional tool in many areas of adult literacy. Computer-assisted instruction (CAI) is the most common use. CAI offers the adult learner privacy, control, immediate feedback, and flexibility (Askov, 1991). CAI is available both as an integrated learning system (ILS) and as software in a stand alone computer. Many of the first CAI software programs were text-based programs that were, in effect, electronic books. Today, CAI programs are using multimedia technology that combines the visual power of the television with the interactive capability of the computer. Brought together in one software package, multimedia programs offer sound, full-motion video, and interactivity, making literacy instruction interesting, motivating, and effective. New and more powerful multimedia programs called hypermedia are beginning to help adult learners explore databases and access information in new ways that enable them to form their own schemas on the basis of personal interests and associations (Turner, 1993). Hypermedia offer instructors the ability to customize instruction to meet the personal needs and goals of a wide variety of adult learners. Beyond direct instruction, technology is also used widely by instructors and tutors to generate materials used in the classroom to support the instructional process. Word processing and desktop publishing, in particular, are used to generate tests and text materials for basic literacy instruction.

With the advent of broadcast television and more recently, VCRs, many excellent instructional video programs have been developed. The use of hand-held video cameras and hand-held language devices is changing literacy instruction as well (Turner, 1993).

Finally, technology is being used to test and evaluate adult learners. Scanning devices attached to a computer processor are used to develop portfolio assessments and on-line assessment tools. These assessment tools are built into existing software packages, provide adult learners with immediate feedback about their progress, and enable instructors to get concise progress reports about student learning gains.

The range of technology solutions is almost unlimited, so organizations must take the time to analyze each possible solution and look at its advantages and disadvantages in light of the organization's particular educational goals and preliminary vision. It is also important to keep in mind that although many literacy organizations use high-end technologies such as computers and telecommunications, low-end technologies such as VCRs and audiotape players can be used very effectively as well and should be considered for the solutions that they might provide.

The following should be considered when identifying specific opportunities for technology use:

1. Identify the advantages and disadvantages of using specific technologies with adult learners and staff. Focus on enhancing regular routines, practices, and activities and solving existing problems.
2. Identify what should be changed in the methods of instruction or administrative practice in order to implement the technology solution; determine how the technology solution will be integrated into instructional and administrative activities.

3. Determine how students, teachers, staff, and the technology will interact with each other. Forecast how the use of technology will change the relationship between students and teachers and between staff members.
4. Determine who will have access to the technology and when.

Step 6: Re-Examine the Preliminary Vision—Set Technology Vision and Priorities

It is a good idea at this point to re-examine the preliminary vision before moving ahead to make specific technology purchases. After exploring available internal and external resources, determining what instructional, administrative, or other issues might be solved or addressed through technology use, and investigating specific types of technology and their possible application to adult literacy, the organization will be in a better position to finalize a technology vision and to determine short- and long-term goals and objectives. This is the time to either solidify the preliminary vision or modify that vision as has been seen to be necessary.

Step 7: Evaluate Specific Technologies

The evaluation of specific technologies should result in selecting the best technology to achieve the objectives and solutions identified earlier. This step moves from examining general technology solutions to looking at specific technology products and models. These products and models will be used to develop the technology budget.

Staying abreast of current technology developments is a major issue for adult literacy organizations. Often, just when a decision is made about what to purchase, a new product or a new vendor comes onto the market. Thus, as technology expands, so does the need to know about the new technologies. For literacy providers the problem is exacerbated by the fact that there is little information available about the application of technology to adult literacy. The lack of information about effective evaluation procedures can result in costly and inappropriate selections. The amount of time, effort, and energy required to select software and hardware for an adult literacy organization causes many teachers and administrators to give up entirely. Poor choices can also result in student and instructor resistance, which delays further involvement in technology.

It is recommended that software purchasing decisions be made before hardware purchasing decisions whenever possible, because the hardware by itself does not provide instructional value (Fleischman & Porter, 1993). Skills and knowledge are gained through the use of effective software that addresses the needs of the user. Some ways to identify software programs that are appropriate for adult learners include reading software reviews in education magazines, attending vendor demonstrations and conferences, consulting education computer user groups, consulting colleagues who use software in classroom settings, and visiting software preview centers at local schools and colleges.

Organizations or projects formed specifically to assist educators in the selection of appropriate software programs are particularly good sources of formal evaluations of the different programs available. Most of these projects also offer summaries of software that is appropriate for adult literacy students.

It is unlikely that any individual piece of software or any integrated learning system will meet all of the instructional needs of any group of students. Evaluators will have to make judgments about whether the inadequacies of a software package can be overcome by other means. Once software is selected, hardware evaluation (CPU, printers, peripherals) should be based on the type of hardware needed to operate particular software applications. For software applications, ask the following hardware questions: What are the requirements for RAM memory? How many disk drives or how much hard disk space is required? What type of monitor, printer, and special features are needed to run the software package? Remember to evaluate the hardware that your organization already has. Try to project its remaining useful life and its ability to operate new software.

When evaluating specific technologies consider the following procedure:

- Use the technology solutions and objectives identified earlier as the basis for selecting specific hardware, software, and other products.
- Select various software, hardware, and low-end technology products to preview. Selection techniques may include vendor demonstrations, catalog descriptions, published evaluations, or a visit to a preview center to review software.
- Evaluate hardware and software products using techniques and procedures identified by colleagues, technology publications, and other programs.
- Select software programs, computers, and other technology products for purchase; include these in the technology budget.
- Evaluate hardware and software in relation to their upgrade-ability. Many emerging technologies have built-in adaptability for future add-on options, which, for a minimal cost, can extend the life of the technology beyond its present value.

Step 8: Develop a Technology Budget

Developing a technology budget focuses attention on the resources necessary to meet the identified objectives. Judgments on resource allocation and trade-off decisions between different types of technology can be made at a planning level before the technology is purchased. This is preferable in order to avoid making costly midstream adjustments when finding that resources do not cover overly optimistic objectives. The following stages may be useful for developing a technology budget.

1. Gather information about the cost of the various hardware components that are needed to operate each of the software packages. Determine the per workstation cost of the hardware, where workstation is defined as all of the components of the system (i.e., computer, monitor, hard drive, printer, CD-ROM player, laser disc player, etc.). Keep in mind that if existing hardware is being used, the per workstation cost will include only the new components needed to operate the software (e.g., CD-ROM). Second, develop a price per workstation cost for each of the software packages identified.
2. Use the price information in conjunction with the evaluations made in other steps to determine the pros and cons of the various hardware and software options. Tradeoffs include issues such as price, learning curve for staff, ease of use for students, funding constraints, instructional effectiveness, expected lifespan of technology, maintenance expenses, and so forth.
3. Identify possible staff development needs and their cost. As a general rule, 10% of the dollars allocated for technology should be planned for staff development.
4. Start a budget worksheet. For each piece of hardware and software, list the price as well as the cost of necessary staff development. The following breakdown provides a useful guide for allocation of resources:

Item	% of Budget
Software	20%
Hardware	60%
Staff Development	10%
Maintenance	5%
Miscellaneous Supplies	5%

5. Determine how much money the organization has available to purchase technology within existing budgets.
6. Examine ways in which the organization could reallocate existing dollars to cover some of the technology costs. Analyze how reallocation of existing dollars would affect the organization.
7. Compare fiscal resources available, including reallocated resources, for the proposed technology budget. If there is a shortfall, consider the options for making up the difference. For example, the organization could write technology into existing grants, discuss with administration the possibilities of gaining access to additional institutional resources for technology use, or write new grant proposals.
8. Think about who could be contacted and where to look for new technology funds. In particular, examine foundation grants, state and federal grants, corporations, or gifts-in-kind. For other ideas, refer to *Funding Technology in Adult Literacy*, a guide published by the National Center on Adult Literacy, which provides useful information and resources to assist literacy educators in funding educational technology.

STEP 9: DETERMINE STAFF DEVELOPMENT NEEDS

When considering the real costs of implementation in terms of time, money, and organizational impact, training instructional staff is a major factor to be addressed. In terms of actual staff development—which differs from staff awareness activities conducted as part of the planning activities—organizations should focus on preparing staff to deliver instruction and use technology for everyday activities. Comprehensive training is essential for two reasons. First, proper training will allow staff to make informed decisions regarding software selection and technology integration. Second, only well-trained, confident staff members can effectively train and support other staff members and use technology effectively with students.

The first type of training to be made available should be directed to those individuals responsible for maintaining the computers. This training will need to include the management and maintenance of computer systems and the investigation and resolution of technical problems. Technical support staff have the task of trying to stay current with the latest technological developments in order to provide up-to-date service for the current system. Whether an organization has a volunteer technician or a full-time technical person, ongoing training is needed.

Individuals responsible for choosing instructional software should be well trained and afforded time to stay current with the latest software developments. Those who will be choosing software applications for the literacy organization should understand the software's inherent capabilities, limitations, and effective uses and how these relate to the needs of the organization. They should work closely with instructors and technical people to ensure that the best and most appropriate software is selected.

Teachers, administrators, and other personnel must all know how they can use the technology to support their particular responsibilities. While a broad array of software may be of interest to them, these individuals are typically pressed for time and will initially prefer training that directly supports their particular work. Nonetheless, training must be broad enough to open the minds and imaginations of the users. Training for non-technical personnel should include these four critical, interconnected components:

- Basics of the hardware,
- Elementary functions of the software (e.g., how to open a lesson or enroll a student),
- Integration of the software into instruction, and
- Evaluation of software from an educational and social perspective.

Anyone who has participated in a discussion about technology knows that no two people view technology in exactly the same way, learn at exactly the same pace, or develop the same level of interest in technology. Staff trainers and outside consultants are faced with the complex task of designing and facilitating training that covers a core set of topics, but is flexible enough to support each individual staff member. Several models exist for training that is both relevant and cost effective. These include, but are not limited to, the following:

- Workshops that begin with standardized group instruction and then allow time for users to explore on their own, asking questions as they arise;
- One-on-one instruction and small group instruction in which individuals with like skills and/or interests are grouped together;
- Workshops with participants with varied skills organized in small groups—the more experienced can serve as mentors, peer coaches for the less experienced; and
- Hands-on tutorials in which staff members can come and go and learn at their own pace.

In all of these models, staff members should be encouraged to rely on one another whenever possible. This not only encourages collaboration and communication, but also prepares staff members to assist one another when trainers are not available. Following are some basic guidelines for building an effective technology staff development program:

- Basic technology training should be provided in a sequence that gradually increases in complexity and is sufficiently flexible to allow trainees to begin at their own level of ability and progress at their own rate.
- Training should be designed to allow instructors the opportunity to practice new skills in the course of their regular teaching.
- Training should take place during the work day, make use of actual situations involving students, and provide incentives that motivate staff to participate actively.
- Whenever possible, staff members within the organization should be used as instructors for the training.
- Training should encourage staff to support each other in their use of technology.

Step 10: Develop a Technology Implementation Timeline

At this stage of the planning process, priorities and objectives are clear, staff development activities have been identified, and the budget is determined. The literacy organization has direction and long-term technology objectives. Implementation, since it is an ongoing process, requires the development of a timeline, which should reflect dates and milestones for the achievement of short-term and long-term objectives. For each new technology introduced to an organization, there will be stages within the implementation process that include fund-raising, evaluation, selection, installation, training, pilot projects, mini-implementations, and finally, full implementation. These stages should all be reflected in the timeline. It is important that the timeline follow established goals, objectives, and priorities; build in time periods to assess and reassess resources; include time to evaluate the plan; schedule training on an ongoing basis; and include feedback time to keep all stakeholders informed and ready for changes.

Finally, it is important to remember not to judge technology as ineffective when it is not implemented according to the plan (Holmes & Rawitsch, 1993). Flexibility, patience, and adaptability are essential for any kind of change process and certainly for implementing technology.

Step 11: Conduct an Ongoing Evaluation of the Technology Plan

Technology planning is a continuous process that adapts to the organization's changing circumstances and includes ongoing evaluation. Effective evaluation will force planners to rethink and adapt objectives, priorities, and strategies as implementation proceeds. Continuing evaluation also facilitates making changes if aspects of the plan are not working.

An evaluation can be conducted by various means. Simple observations, both negative and positive, that have been made by students and staff members using the technology are the most helpful. Interviews and informal meetings with both instructors and students can draw out the lessons that both groups have learned from using the technology. A simple written survey can assist in measuring the extent to which the plan has met its original objectives and expected outcomes.

The following questions should be part of the ongoing evaluation:

- Are the plan's vision, goals, and objectives being achieved? What evidence exists to support this?
- Are the original objectives and technology solutions appropriate and realistic? Do they need to be modified?
- Is there a need to rethink the information that was originally collected in the inventory? Are there new, emerging technologies that should

be included in the technology plan? Are there new financial or human resources to utilize?

- What is the current effect of training on implementation? Does training need to be modified?
- What level of cooperation and enthusiasm is encountered during implementation? What resistance is encountered? What is being done to overcome the resistance? What are the implications of the resistance?
- What are some of the major problems that have been encountered? How have they been resolved? Have the resolutions improved implementation?
- Is the timeline realistic?

Finally, review the plan periodically to make adjustments. Continue to monitor implementation and always inform, educate, and motivate the stakeholders who are involved..

CONCLUSIONS

It is apparent that participation in a systematic planning process can help adult literacy programs, organizations, and consortia to capitalize on the opportunities available through the use of technology. Systematic planning—whether simple or complex—can help to maximize the investment of resources in technology.

Several factors should be kept in mind in order to maximize the impact of the technology planning process. Administrative involvement and leadership are crucial to the technology planning and implementation process. If organizational leaders do not understand and support the technology plan, it will be difficult to implement and can be either intentionally or inadvertently sabotaged.

Many people perceive that without a technology champion or advocate who will take responsibility for promoting the planning process and implementing the plan, there will be no major push to make technology an integrated part of the organization. If the plan relies on only one person, however, it will almost certainly be unsuccessful. Planning needs a person to spearhead the technology effort, yet it cannot rely on one person alone. Implementation is best when tasks and duties are shared and delegated, and when individuals across the organization buy in to the use of technology and to the planning process.

Effective implementation of technology requires a change in culture—one that encourages people to think differently about the teaching and learning processes and the possibilities for technology use. Training and positive role-modeling are important for helping to facilitate the change in attitudes and culture. Also, attention to internal marketing can help to change attitudes and build enthusiasm and participation. This kind of marketing should be based

upon showing how technology will enhance the organization's purpose and goals and solve organizational and educational problems.

Flexibility is also a key ingredient of the technology planning process. Planners should set priorities, follow a timeline, and continue to evaluate progress. Yet, day-to-day demands will intervene, priorities will change, and resource availability is likely to be inconsistent. It is therefore important to be flexible, to expect the unexpected, and yet to remain committed to pushing forward the technology planning and implementation process.

Finally, while financial resources are likely to be scarce, the plan should not be budget driven. Rather, the vision and organizational and educational objectives should drive the plan. Fund-raising activities should complement and follow the planning process. They are more likely to be successful when an organization knows clearly where it is headed in terms of technology use and has a written plan outlining that use. The familiar maxim holds true for technology planning, "If you don't know where you're going, you're likely to end up somewhere else," and conversely, "If you know where you're going, you're likely to get there much more quickly."

REFERENCES

Askov, E. N., & Clark, C. J. (1991). Using computers in adult literacy. *Journal of Reading, 34*(6), 434-437.

Below, P., Morrisey, G., & Acomb, B. (1987). *The executive guide to strategic planning*. San Francisco: Jossey-Bass.

Cohen, D. K. (1988). Educational technology and school organization. In R. S. Nickerson & P. P. Zodhiates (Eds.), *Technology in education: Looking toward 2020* (pp. 231-264). Hillsdale, NJ: Erlbaum.

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York: Teachers College Press.

Donohoe, A., Campbell, J., Ciggs, C., Rethemeyer, R. K., & Hopey, C. E. (1995). *Making sense of technology terminology for adult literacy: A glossary and annotated bibliography* (Practice Guide No. PG95-01). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Fine, M. F. (1991, January). Going high tech: Computerized literacy Instruction. *Adult Learning*, 11-14.

Fleischman, J., & Porter, D. (1993). *Shifting paradigms: technology and adult education*. Washington, DC: National Adult Education Professional Development Consortium, Inc.

Holmes, K., & Rawitch, D. (1993). *Evaluating technology-based instructional programs: An educator's guide*. Denton, TX: Texas Center for Educational Technology.

Hopey, C. E., & Harvey-Morgan, J. (1995). *Funding technology in adult literacy* (Practice Guide No. PG95-03). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Hopey, C. E., Rethemeyer, R. K., & Elmore, J. (1995). *Making the right choice: Evaluating Computer software and Hardware for adult literacy instruction* (Practice Guide No. PG95-04). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Lovell, M. (1993). Technology: How is it used in programs? *Adult Learning*, January/February, 7-9.

Massachusetts Software Council. (1994). *The switched-on classroom: A technology planning guide for public schools in Massachusetts*. Boston: Massachusetts Software Council, Inc.

Means, B., Blando, J., Olson, K., Middleton, T., Morocco, C., Remz, A., & Zorfass, J. (1993). *Using technology to support education reform*. Washington, DC: Office of Educational Research and Improvement, United States Department of Education.

Piele, P. K. (1989). The politics of technology utilization. In D. E. Mitchell & M. E. Goertz (Eds.), *Educational politics for the new century: The twentieth anniversary yearbook of the Politics of Education Association* (pp. 93-106). London: Falmer Press.

Rethemeyer, R. K. (1995). *Joining the on-line community: An introduction for adult literacy* (Practice Guide No. PG95-05). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Shirley, R. C. (1988). Strategic planning: An overview, successful strategic planning: Case studies. *New Directions for Higher Education, 64*, 5-14.

Turner, T. C. (1993). *Literacy and machines: An overview of the use of technlogy in adult literacy programs* (Technical Report TR93-3). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

United States Congress, Office of Technology Assessment. (1993). *Adult literacy and new technologies: Tools for a lifetime* (OTA-SET-550). Washington, DC: U.S. Government Printing Office.

APPENDIX A: STAKEHOLDER ANALYSIS CHART*

STAKEHOLDER SUMMARY

Stakeholders	Their Interest in Technology	Level of Interest (Resistance or Enthusiasm)	Expected Outcomes of Using Technology	Role in the Technology Planning Process
Example				
volunteers	*tool for instruction*	*resistant*	*improve volunteer-student interaction*	*input and feedback*

* This chart was adapted from *The Switched-On Classroom: A Technology Planning Guide for Public Schools in Massachusetts.*

APPENDIX B: TECHNOLOGY RESOURCE INVENTORY CHART

RESOURCE SUMMARY

Technology Resource	What Can the Resource Offer the Organization	Availability and Cost of the Resource	Resource's Experience With Technology	How the Organization Could Use the Resource	When, Where, and Why the Resource Can Be Used in the Planning or Implementation Process
Example					
Public Library	*access to technology publications*	*free*	*limited*	*locate published software reviews*	*during evaluation and selection of software*

APPENDIX C: SAMPLE OF A TECHNOLOGY PLAN

This sample technology plan was written by a public library literacy program in a large urban area. The program serves approximately 400 students per year and receives funding from federal, state, and local grants as well as from the library operating budget.

The library uses technology extensively for student instruction and has begun using on-line communications. The plan is written in a format that conforms to the particular needs of the library program.

VISION FOR FUTURE TECHNOLOGY USE

The Public Library Literacy Program is committed to the use of the latest technologies available to enhance and accelerate the learning of the adults enrolled in our educational program. We will continue to seek out the newest tools and apply them appropriately using collaborative learning, group interaction, exploration, and the concept that learning is fun when experienced in an empowering setting. We are committed to learning all we can about technology and to that end we are committed to attending conferences that involve technology. We will not limit ourselves to the field of adult education or literacy; we will seek technology learning experiences wherever offered, including K-12, graduate level, continuing education, and so forth.

In addition to seeking learning wherever available, including the wonderful resources on-line that were made available to us through this project, we seek to use technologies other than computers. To this end, we have purchased laser discs, a Quicktime™ camera, a video camera, a still camera, and a scanner to enlarge our visions.

Our vision includes ideas that will be implemented directly and ideas that will be implemented within a year and in five years. In the near future, we plan to explore distance learning and telecommunications. The immediate plan includes the exploration of HyperCard. HyperCard has been installed in each of the five learning centers. Learners will be instructed on how to use this as an authoring tool, and they will be encouraged to develop their own learning projects. The immediate future includes training learners to assist computer aides in the computer rooms. And last, but not least, we will link our five centers via telecommunications. Staff and learners will be trained to use America Online.

Benefits for Learners

Since the benefit of learners is our number one goal in this program, we would not be committing to technology if we thought that this was not an appropriate tool for advancement. Learners will gain important computer skills that will not only be transferable to the workplace, but will also place them far ahead of most of their contemporaries. These learners, who have functioned in the deficit sector for most of their lives, now will own an asset that is immeasurably powerful. Technological skills increase learner self-confidence and motivation to learn. Learners who are parents know that they need to understand technology in order to support their children's learning.

Projected Instructional and Programmatic Outcomes

Statistics from the last fiscal year (July 1, 1993–June 30, 1994) indicate that computer use has both significantly impacted the number of instructional hours that students have committed to their learning and improved retention rates. In 1993, 43% of the students were utilizing computers; in 1994, this figure grew to 74%. Total hours of usage grew from 3,746 to 12,242, an astounding 340% increase! Some particularly active computer rooms have had their contact hours increase from an average of 7 to 28. Learners are quadrupling their time spent learning! Portfolios reveal that learners have accelerated their learning process specifically in the area of writing. Although critical thinking and problem solving are harder to measure, the undertaking of projects (that require information literacy and critical reflection) by an ever increasing number of learners indicates to us that these skills are being developed. The creation of a completely student-run newspaper, editing house, and student council indicates to us that learner self-confidence has grown.

Although this report seeks to elicit our instructional goals and objectives for the learners, we are unable to respond in quite this manner. We work towards the learners formulating their own goals and objectives in using technology. For example, one learner in the Island Learner Center, who worked on a project of compiling a directory of businesses in the area, was so enthusiastic at the end of the project that the very next day he submitted a proposal for new projects. He was given the green light by the literacy advisor and he formulated a list of possible projects. He is now independently seeking other learners to work with him on a new publishing project. He has contacted learners in other learning centers who know how to use PageMaker to assist him. By the way, PageMaker was just installed at his learning center.

We can safely project that these experiences will multiply and continue to grow. All learners entering our program are offered the same opportunities in the computer room. Staff have indicated that reading level makes no difference when it comes to developing computer competency. Non-readers in particular are encouraged to take part in all literate reading and writing communities and are offered enrichment throughout the program.

ENVIRONMENTAL SCAN

INTERNAL SCAN

Strengths: All staff members possess basic computer literacy skills and utilize word processing tools. A strong staff development model is in place that encourages and pays staff to continue to develop their computer skills. The literacy advisor, whose responsibility it is to maintain a smoothly running computer room, receives ongoing training in utilizing the computer as a learning tool. This is accomplished through a monthly computer club and participation in special training of computer aides.

Weaknesses: Volunteer tutors are only marginally involved in computer-assisted instruction. The publication of *TechTalk*, our newsletter, has developed an awareness of how learners are progressing in the computer rooms. Tutors must be brought on-line into the technology aspect of our program.

Financial resources: Our technology project has been financed through LSCA grants from the Federal and State government. The funding includes money for hardware, software and staff development. The Public Library administration is extremely supportive of technology and has provided in-kind services and financial support. The Mayor's Office of Adult Literacy provides the major funding of the program. The Library supports the program to the extent that we have been provided with appropriate furniture and lighting, and entire rooms have been moved to accommodate the programs' needs. The Library's Strategic Plan includes technology and an upgrading of its use. Services and shared information will benefit all citizens of the city.

EXTERNAL SCAN

Support Services for Technological Help: New York City Adult Literacy Initiative Programs (in which we participate) are provided assistance by the Literacy Assistance Center (LAC). Visits to the LAC at the start of our journey into technology enabled us to make informed decisions about hardware and software. Playing to Win, a community-based technology program, also offered assistance in urging us to look past electronic workbooks currently on the market to productivity tools. We followed their lead.

Recently we have had to do our own research and development because few people are moving in our direction. We attend national conferences: in the past year, we attended the NECC conference in Boston, the NEA conference in Albuquerque, the TRLD conference in Baltimore, the MacAcademy in New York, and the Adult Learning and Technology conference in Atlanta.

Other Providers Using Technology: At this point, we are serving as a resource for most programs that we come across. We are currently involved in helping a local Even Start program set up its Computer Room since they were very impressed with our Bedford Stuyvesant Learning Center. We have worked with people from City University and the other public library systems.

Research on Technology: We read everything we can find on technology in education. The director of the program has joined the International Society of Technology Educators (ISTE).

We currently subscribe to: *Computing Teacher, Electronic Learning, Wired, Inside the Internet, Inside Microsoft Works, Technique, Aid for Education,* and *MacWorld.* In addition to these, we subscribe to the Adult Education periodicals and receive newsletters from professional organizations such as NCAL.

TECHNOLOGY SOLUTIONS AND OBJECTIVES

All students have the opportunity to work on Macintosh computers in addition to working with a tutor in a small group. Students make computer appointments and work with a computer aide. The computer aide is a facilitator in the computer room and works to see that learners become computer literate and can increasingly understand and solve the problems that they may encounter when using the computer. Peer teaching and sharing of knowledge among adult learners is also encouraged. We would like to increase the number of computers by three. We would also like to use Apple Macintosh TV computers.

Our technology vision for the future includes the formulation of a curriculum that will include the learning of databases, spreadsheets, desktop publishing and the skill and confidence to investigate the whole realm of software available. Our vision also includes lending out laptop computers, so that students can work on their projects at home in time chunks unlimited by another anxious learner.

Our future vision includes staff development through the use of on-line technology and public library specific bulletin boards. These boards will be for the posting of queries by tutors to others. We will connect our five sites via America Online. We need computers and a phone line for each center.

In the near future, we plan to draw volunteer tutors into technology. We will introduce them to the capabilities of using productivity and research software and ways of using this software in conjunction with their own lesson plans. For example, if learners are writing stories about their homeland, tutors can suggest to the computer aide and learner that they research their countries on MacGlobe, by Broderbund. Students could then produce a desktop-published anthology of stories about their countries including maps that they have "cut and pasted" from MacGlobe.

Technology will improve instruction by giving students more opportunities to read and develop writing skills. Word processing tools have revolutionized writing by making revision an easy process.

Tutors who have worked within our philosophy and who involve learners regularly in writing and developing learner-centered projects will probably find computers to be another excellent pathway toward learning. Those tutors still in the program who have held back and continue to sneak in workbooks will probably not want to use technology. What we have found is that the workbook mentality generates very limited thinking about our learners. If you park anyone in a workbook long enough, they are going to start looking pretty limited. The result will be that those tutors will not see their students as capable of working within an application environment in the computer room. We will need to continue to be diligent in retraining or retiring these people.

Some people volunteer to tutor because they want to be in the position to help someone. In order to be helpful, you need people who are helpless. Those tutors may be unconsciously resistant to seeing their students become empowered. This has impacted on our program. We are now changing our tutor outreach and selection process so that we attract people who are not teachers but learners. We are seeking people who see doing this work as a way of developing new skills. We will buy new software so tutors and students can use it together.

EVALUATE TECHNOLOGIES

SOFTWARE

We currently use productivity software and research tools such as MacGlobe and Compton's Encyclopedia. We are interested in exploring simulations and tutorials as other pathways to learning. We see simulations as ways of providing learners with an environment that they can manipulate, giving them authentic practice, while giving us a window into how much learners can accomplish in these environments. There seems to be very little simulation software out there. The software developed by Brett Bixler, *A Day In The Life*, is close to such a simulation. It places the learner in an environment that he can manipulate through pushing buttons in order to solve reading and writing problems that he would come up with in a workplace setting. We need more such software. Here at BPL we are avoiding drill and practice software. Repetitive practice can put even the most diligent teacher or learner to sleep.

Currently, students often select the word processing software with which they are most familiar. People have a tendency to stick to a familiar tool that works. We decided to start program-wide computer clubs for learners so that they can learn more about a broader range of software by coming into contact with new people. Basically, the computer aide and literacy advisor make the first software choices for learners, but later on learners decide which tools they will use. For example, a computer aide may introduce learners to two word processing programs, The Writing Center by The Learning Company and MacWrite II. In time, the learners may only use The Writing Center because they like the picture file. In a learner-centered program it is important that learners make these decisions.

HARDWARE

We have 4 Macintosh LC2s at each learning center along with ImageWriter printers and CD-ROMs. At two learning centers where publishing projects take place we also have scanners. As utilization of the computer room continues to increase we would like to increase the number of computers, updating the models as we go along. We will continue to purchase Macintosh hardware because of ease of use.

In order to be effective, our software generally needs a printer and often a CD-ROM. More important, we need enough memory and space on the hard drive to run the software. We are currently updating computer memory, since we have just about run out of it. In the future, as we plan software purchases, we will certainly keep in mind how much memory the software uses.

Computers are available in CAI centers at each learning center. The computers are secured together with locks. Four of our CAI centers are located in rooms with locks. The fifth center is located out on the floor of the learning center. We were concerned about the security at this center. However, we feel that, as the library and literacy program continue to integrate computer technology into our services, we need to get past this fear, secure the computers with a good security system and that's that. CAI hours are identical to learning center hours.

TECHNOLOGY BUDGET

Technology is infused in about 80-85% of our current projects. Our technology budget for the future will include money for staff development—the training of computer aides, computer clubs, and on-line costs. We have built a line for on-line costs into our budget for the next fiscal year. We are committed to this and will get the money from wherever we must. We will pursue grants and any opportunity that arises to fund this venture. The joy that we feel as we see the adults learning and empowered, speaking in public and getting jobs they once only dreamed about, is a pure motivational force.

OUR BUDGET INCLUDES:

8 Macintosh TV computers w/CD-ROM	$7,200
Software	$2,000
Computer seminar at City University for 2 computer aides	$400
Technology guidebook from State Literacy Resource Center	$100
America Online software and materials (5 sets)	$150
On-line charges for 12 months (5 accounts; $10 each, per month)	$600
Telephone charges	$1,500
Total	$11,950

COMPUTER AIDES

Computer aides are hired and trained in groups once a year. Training is configured in a group so that aides can develop work relationships from the start and begin to work within a team, with a problem-solving approach. Teamwork and the sharing of ideas have been extremely important to the success of our program. If people work in isolation or don't share, great ideas and projects tend to remain unknown. The more ideas are shared, the more complex work gets accomplished.

The initial training consists of four 3-hour sessions in which new aides are immersed in our technology program. They learn about our project goals, methods of facilitation, the hardware and software, record-keeping (for evaluation purposes and to assure continuity from aide to aide in busy computer centers), creating databases, instructional applications for all productivity tools, multimedia, and the CD-ROM. Instruction is delivered through articles, demonstrations, hands-on sessions, videos, and informal talks. Between sessions, aides are paid for the time they practice utilizing the hardware and software. Learning to utilize productivity tools takes a lot more time than booting up educational software. We provide the time and encourage aides to work on their own projects. After the initial training, new aides are teamed with experienced computer aides first to observe and then to practice facilitation under the watchful eye of a more seasoned person. Our concern is that new computer aides have a tendency to do too much for the adult beginning learner. They need to learn how to model problem solving without actually doing it, to talk students through a function without grabbing the mouse. They also need to learn how to step back and let students discover their own solutions. Experienced computer aides can show them how to deal with a packed computer room where some learners may need more support than others. We will try this year to send the best two computer aides to a city university seminar on desktop publishing so they can then train other computer aides.

Periodically, training events are offered to all computer aides to explore new computer applications. For example, a training event consisting of several intensive sessions is planned later this fall in order to look more closely at spreadsheets, graphic applications, and student-developed projects.

A computer club meeting is also organized each month for all computer aides. At these paid, staff development events, computer aides are encouraged to exchange information and play with new software. At the first computer club meeting of this new funding year, aides will get together to forge an exploratory project organized around learning about HyperCard. Projects are a way to contextualize learning. Whether staff, aides or students are learning something new, we have found that projects have been a really good way to get learning happening. Trying to learn how to use HyperCard without doing something with it would be pretty impossible. The *TechTalk* newsletter was created to circulate ideas about computer technology applications.

Finally, computer aides are also paid for time when they come in on their own to explore software. For example, at the Williamsburgh Learning Center both computer aides come to the center to explore software on Fridays when the center is closed to the public.

STAFF

The staff also continue to learn about computers by attending the computer aide training and club meetings. When new staff are hired to work on special projects, such as tutor training or outreach, they are invited to attend training events as a way of making them more acquainted with technology. All support staff need to know about this project and keep up to date with it. *TechTalk* helps with that.

TUTORS

It will be difficult to duplicate what we do for small groups of aides because we are limited by the number of computers we have per learning center. Since we need to begin bringing tutors into this project right away, we are going to begin to bring them into the computer room with learners during the time they are tutoring. Tutors can see first hand how the computer supports the writing process.

EVALUATION

We have been evaluating our program using several different tools:

1. A questionnaire was given to all adult learners during their first computer appointment and then again three months later to measure changes in the learners' perceptions of themselves as users and in skill level. This questionnaire revealed that learners were becoming computer literate, were delighted to be using the new hardware and software, and saw the computer as enhancing their lives and workplace skills. Interestingly, one question on the questionnaire revealed that some students were buying more computer-like toys for, and sharing information with, their children.
2. Keeping record of appointments and usage time and number of students in the computer room indicates that computer-assisted instruction has increased dramatically.
3. Portfolios, published anthologies, and active bulletin boards indicate an explosion of writing and development of the quality and quantity of writing.
4. The education coordinator periodically visits computer rooms and speaks directly to learners about their perceptions of the impact of computer use on their learning.
5. We encourage continual discussion and continual input of new ideas about new software.

Our evaluation process is part and parcel of our everyday functioning. We are always looking at how to make things better and easier. In accelerating the

learners' education, some of our staff believe that we are out to make things harder for them. Something that has not been addressed in this report as part of the vision of the future includes the need to evaluate personnel. Staff must buy into the vision, staff must be learners, staff must know that the learners are their equals, and if intense efforts at communicating this fail, those staff must go. This is what we do, this is what we have done, and that is what we shall continue to do.